

WHAT IS CLAIMED IS:

1. An apparatus comprising:  
  
a discriminator to detect unique signal tags in signals sent from a transmitter, the unique signal tags generated by signal repeaters, to demodulate signal tags, and to generate repeater IDs from the signal tags; and  
  
a TOA (time of arrival) receiver to measure a propagation time delay for the signals from the transmitter;  
  
the discriminator and TOA receiver being coupled to a location center (LC) to determine a position of the transmitter based on the TOA receiver measurements and the repeater IDs.
2. The apparatus of claim 1, wherein the transmitter comprises a mobile unit, and the location center comprises a mobile location center (MLC).
3. The apparatus of claim 2, wherein the MLC determines the position of the transmitter based on the TOA receiver measurements and the repeater ID by looking up the TOA receiver measurements and the repeater ID in a database that includes geographical coordinates of the repeater corresponding to the repeater ID and a number of corresponding base stations.
4. A system comprising:  
  
a receiver to receive an electronically tagged signal generated by a signal repeater, the original signal being sent from a transmitter;  
  
a corresponding location management unit coupled to the base station to demodulate the tagged signal, and to generate a repeater ID signal therefrom; and

a location center coupled to the location management unit to determine the position of the transmitter based on the TOA receiver measurements and the repeater ID.

5. The system of claim 4, wherein the transmitter comprises a mobile unit, and the location center comprises a mobile location center (MLC).

6. The system of claim 5, wherein the mobile location center determines the position of the transmitter based on the TOA receiver measurements and the repeater tag ID by looking up the TOA receiver measurements and the repeater tag ID in a database that includes geographical coordinates of the repeater corresponding to the repeater tag ID and a number of corresponding base stations.

7. A location measurement unit (LMU) comprising:  
a time of arrival (TOA) receiver to receive signals from a mobile unit and to measure a propagation time delay between the mobile unit and the LMU;  
a discriminator to detect signal tags in the received signals, the tags identifying a repeater through which the signal was received;  
a database having geographical coordinates of identified repeaters; and  
a mobile location center (MLC) to determine a position of the mobile unit from the TOA receiver measurements, and the repeater IDs using the database.

8. The unit of Claim 7, wherein the MLC converts the propagation time delay measurements to distance measurements.

9. The unit of Claim 7, wherein the signal tags comprise frequency shift keying (FSK) modulation.

10. The unit of Claim 7, further comprising a diplexed antenna coupled to the TOA receiver.

11. The unit of Claim 7, further comprising a filter/diplexer coupled to the diplexed antenna.

12. The unit of Claim 7, further comprising an I/Q demodulator coupled to the frequency discriminator.

13. A cellular telephony base station comprising:  
a diplexed antenna;  
a time of arrival (TOA) receiver coupled to the antenna to receive signals from a cellular telephone and to measure a propagation time delay between the telephone and the base station;

a frequency discriminator to detect signal tags in the received signals, the tags identifying a repeater through which the signal was received;

a mobile location center (MLC) to determine a position of the cellular telephone from the TOA receiver measurements, and the repeater IDs.

14. The base station of Claim 13, wherein the signal tags comprise frequency shift keying (FSK) modulation.

15. The base station of Claim 13, further comprising a database having geographical coordinates of identified repeaters, and wherein the MLC determines the position using the database.

16. A method comprising:  
receiving signals from a mobile unit;  
measuring the propagation time delay of the received signals;  
detecting tags in the received signals to generate a repeater ID for each signal containing a tag, the tags identifying a repeater through which the signal was received;

determining a position of the mobile unit from the TOA receiver measurements, and the repeater IDs.

17. The method of Claim 16, wherein receiving signals comprises receiving signals at a time of arrival (TOA) receiver of a location measurement unit.

18. The method of Claim 17, wherein measuring the propagation time delay comprises measuring the propagation time delay between the mobile unit and the TOA receiver.

19. The method of Claim 16, wherein detecting tags comprises detecting tags at a frequency discriminator of the location measurement unit.

20. The method of Claim 16, wherein detecting tags comprises detecting a frequency shift by comparing a frequency of a received signal to a frequency of a second signal from the same repeater.

21. The method of Claim 20, wherein the second signal comprises a synchronization channel signal.

22. The method of Claim 16, wherein the tags comprise a modulation signature applied to the received signal by the identified repeater.

23. The method of Claim 22, wherein the modulation signature comprises a frequency shift keying (FSK) modulation.

24. The method of Claim 16, wherein determining a position comprises converting the propagation time delay measurements to distance measurements.

25. The method of Claim 16, wherein determining a position comprises applying the repeater IDs to a database, the database including geographical coordinates of repeaters.

26. The method of Claim 16, wherein determining a position comprises determining a position on an arctangent basis.